IWU Engineering Program Prospectus

Engineering Major · BSE

IWU offers a four-year degree program in engineering – Bachelor of Science in Engineering (BSE). Within this program, students may choose to specialize in civil engineering, computer engineering, electrical engineering, mechanical engineering or design engineering. IWU also offers an Engineering minor.

Mission Statement

The IWU Engineering program will produce graduates who are diverse and widely recognized for their motivation and faith-inspired call to service, outstanding technical proficiency, broad development from a Christian liberal arts perspective, and mature relational and leadership skills.

Engineering Major · BSE

General program requirements:

28 credit hours of mathematics/natural sciences & computer science:

*MAT 253	Calculus I	4
MAT 254	Calculus II	4
MAT 265	Differential Equations with Linear Algebra	4
*PHY 221	University Physics I	4
PHY 222	University Physics II	5
CHE 488	Chemistry for Engineers	4
CIS 121	Introduction to Programming	3

** satisfy the IWU math/science general education requirements*

26 credit hours of general engineering:

EGR 121	Introduction to Engineering	3
EGR 142	Computer-Aided Design	3
EGR 211	Solid Mechanics	4
EGR 270	Electric Circuits & Instrumentation	4
EGR 230	Engineering Economy	2
EGR 380	Engineering Thermodynamics	3
EGR 360	Engineering & Environmental Ethics	2
EGR 481	Senior Design Project I	2
EGR 482	Senior Design Project II	3

Additional credit hours of discipline-specific math/science requirements	6-7
Additional credit hours of discipline-specific courses	33-34
Other (non-math/science) IWU general education requirements	41
Total required credit hours for the BSE degree	135-136

Individualized Plan of Study

By the end of the fall semester of the sophomore year according to the engineering 4-year course schedule (see sample schedules for each specialization at the end of this document), each student is expected to prepare a plan of study, under the guidance of his or her academic adviser, articulating some individual educational goals in accordance with his/her career aspirations. The plan will attempt to specify mathematics, science, and engineering electives consistent with the student's educational goals. The plan also declares an area of specialization to make sure the specialization's specific requirements can be met in a timely manner.

A student should elect one of the following areas of specialization: civil engineering (CIE), computer engineering (CPE), electrical engineering (EEE), mechanical engineering (MEE), or design engineering (DE).

In consultation with his or her adviser, a student may change his or her plan of study, his or her area of specialization, provided that the requirements for the BSE degree are still met by the altered plan.

Course Completion and Graduation Requirement

All required courses require a grade of "C" or better, and all prerequisite courses must be passed with a grade of "C" or better to qualify for following courses.

Engineering Minor

21 credit hours in engineering (16 required hours and 5 elective hours) and 8 credit hours in mathematics (MAT 253 and MAT 254) required, for a total of 29 credit hours. Here is the breakdown:

16 credit hours required from the engineering core:

EGR 121	Introduction to Engineering	3
EGR 142	Computer-Aided Design	3
EGR 211	Solid Mechanics*	4
EGR 270	Electric Circuits & Instrumentation*	4
EGR 360	Engineering and Environmental Ethics	2

5 additional credit hours from any CIE, CPE, EGR, EEE, or MEE courses as engineering electives (CIS 121 would also count).

* These two courses have either a pre-requisite or co-requisite of MAT 254 Calculus II (4 credit hours).

Civil Engineering Specialization - Program requirement 94 credit hours

28 in mathematics/natural science/computer science core, 26 in general engineering core, 7 additional math, 33 in discipline-specific courses (27 required, 6 electives), and 41 in other gen ed requirements:

7 additional credit hours of mathematics:

MAT 112 or MAT 204	Statistics	3
MAT 255	Calculus III	4

27 credit hours of civil and general engineering:

EGR 320	MATLAB for Problem Solving	2
EGR 390	Heat Transfer	3
CIE 210	Geomatics Engineering	3
CIE 220	Structural Analysis	3
CIE 410	Geotechnical Engineering	4
CIE 450	Urban Hydrology	2
EGR 410	Fluid Mechanics	4
CIE 330	Reinforced Concrete Design	3
CIE 430	Structural Steel Design	3

6 credit hours in civil or general engineering or art/design electives, selected from the following:

CIE 310	Transportation Engineering	3
CPE 210	Digital Systems	3
DES 151	Human Centered Design	3
DES 101	Fund Design Studio	3
DES 303	Structures	3
DES 353	Sustainable Design	3
DES 451	Design Social Entrepreneurship	3
EGR 101	Engineering Shop Experience – CNC	1
EGR 102	Engineering Shop Experience – Machining	1
EGR 103	Engineering Shop Experience – Welding	1
EGR 104	Engineering Shop Experience – Casting	1
EGR 105	Rapid Prototyping – 3D Printing	1
EGR 214	Dynamics	3
EGR 322	Manufacturing Engineering	2
EGR 325	Engineering Materials and Processing	2
EGR 350	Advanced CAD	2
EGR 370	Introduction to Robotics	2
MEE 321	Mechanics of Materials	4
MEE 405	Finite Element Analysis (FEA)	3
CIE 396	Special Topics in Civil Engineering	1-3
CIE 495	Independent Study/Research in Civil Engineering	1-2

Total credit hours for the BSE degree with a specialization in civil engineering **135**

Computer Engineering Specialization - Program requirement 94 credit hours

28 in mathematics/natural science/computer science core, 26 in general engineering core, 34 in discipline-specific engineering (28 required and 6 electives), and 41 in other gen ed requirements, plus 6-7 additional math credits (3 required, 3-4 electives):

3 additional credit hours of required mathematics:

MAT 223	Discrete Mathematics	3

3-4 credit hours of math electives (pick one from the following):

MAT 322	Mathematical Modeling I	3
MAT 112 *or MAT 204*	Statistics	3
MAT 255	Calculus III	4

28 credit hours of discipline-specific courses required:

CIS 172	Objected Oriented Programming	4
CIS 221	Data Structures	4
CPE 210	Digital Systems	3
CPE 340	Microprocessor Systems	4
EEE 320	Electronic Devices and Circuits I	4
CPE 360	Computer Architecture	3
CIS 425	Operating Systems	3
CIS 342	Computer Network Fundamentals	3

6 credit hours discipline-specific engineering or art/design electives from the following:

CIS 320	Intro to Software Engineering	3
CIS 344	Computer Network Security	3
EEE 360	Electromagnetic Fields and Waves	3
EEE 310	Signals and Systems	3
EEE 350	Automatic Control	3
EEE 220	Analysis and Design of Linear Circuits	3
EEE 340	Electrical Machines	2
EEE 430	Communications Engineering	4
EEE 420	Electronic Devices and Circuits II	3
EEE 440	Digital Signal Processing	3
DES 151	Human Centered Design	3
DES 101	Fund Design Studio	3
DES 303	Structures	3
DES 353	Sustainable Design	3
DES 451	Design Social Entrepreneurship	3
EGR 101	Engineering Shop Experience – CNC	1
EGR 102	Engineering Shop Experience – Machining	1
EGR 103	Engineering Shop Experience – Welding	1
EGR 104	Engineering Shop Experience – Casting	1
EGR 105	Rapid Prototyping – 3D Printing	1
EGR 320	MATLAB for Problem Solving	2
EGR 322	Manufacturing Engineering	2
EGR 325	Engineering Materials and Processing	2
EGR 350	Advanced CAD	2
EGR 370	Introduction to Robotics	2
MEE 321	Mechanics of Materials	4
CPE 396	Special Topics in Computer Engineering	1-3
CPE 495	Independent Study/Research in Computer Engineering	1-2

Total credit hours for the BSE degree with a specialization in computer engineering **135-136**

Electrical Engineering Specialization - Program requirements 94 credit hours

28 in mathematics/natural science/computer science core, 26 in general engineering core, 25 in discipline-specific engineering and computer science, 8 engineering or art/design electives, and 41 in other gen ed requirements, plus 7 additional math:

7 additional credit hours of mathematics:

MAT 112 or MAT 204	Statistics	3
MAT 255	Calculus III	4

25 credit hours in discipline-specific engineering and computer science:

CPE 210	Digital Systems	3
CPE 340	Microprocessor Systems	4
EEE 360	Electromagnetic Fields and Waves	3
EEE 320	Electronic Devices and Circuits I	4
EEE 310	Signals and Systems	3
EEE 350	Automatic Control	3
EEE 220	Analysis and Design of Linear Circuits	3
EGR 320	MATLAB for Problem Solving	2

8 additional credit hours in engineering, computer science, or art/design electives, selected from the following (at least one course must be at the 400 level):

EEE 340	Electrical Machines	2
EEE 430	Communications Engineering	4
EEE 420	Electronic Devices and Circuits II	3
EEE 440	Digital Signal Processing	3
CIS 342	Computer Network Fundamentals	3
EGR 101	Engineering Shop Experience – CNC	1
EGR 102	Engineering Shop Experience – Machining	1
EGR 103	Engineering Shop Experience – Welding	1
EGR 104	Engineering Shop Experience – Casting	1
EGR 105	Rapid Prototyping – 3D Printing	1
EGR 214	Dynamics	3
EGR 322	Manufacturing Engineering	2
EGR 325	Engineering Materials and Processing	2
EGR 350	Advanced CAD	2
EGR 370	Introduction to Robotics	2
MEE 321	Mechanics of Materials	4
MEE 324	Mechanics & Design of Machinery	3
MEE 405	Finite Element Analysis (FEA)	3
DES 151	Human Centered Design	3
DES 101	Fund Design Studio	3
DES 303	Structures	3
DES 353	Sustainable Design	3
DES 451	Design Social Entrepreneurship	3
EEE 396	Special Topics in Electrical Engineering	1-3
EEE 495	Independent Study/Research in Electrical Engineering	1-2

Total credit hours for the BSE degree with a specialization in electrical engineering **135**

Mechanical Engineering Specialization - Program requirements 94 credit hours

28 in mathematics/natural science/computer science core, 26 in general engineering core, 33 in mechanical engineering (27 required, 6 electives), and 41 in other gen ed requirements, plus 7 additional math:

7 additional credit hours of mathematics:

MAT 112 or MAT 204	Statistics	3
MAT 255	Calculus III	4

26 credit hours in mechanical engineering:

EGR 214	Dynamics	3
EGR 320	MATLAB for Problem Solving	2
EGR 390	Heat Transfer	3
MEE 321	Mechanics of Materials	4
MEE 324	Mechanics & Design of Machinery	3
MEE 403	Machine Component Design	3
EGR 410	Fluid Mechanics	4
EGR 350	Advanced CAD	2
EGR 322	Manufacturing Engineering	2

7 credit hours in discipline-specific engineering or art/design electives, selected from the following:

EGR 101	Engineering Shop Experience – CNC	1
EGR 102	Engineering Shop Experience – Machining	1
EGR 103	Engineering Shop Experience – Welding	1
EGR 104	Engineering Shop Experience – Casting	1
EGR 105	Rapid Prototyping – 3D Printing	1
EGR 325	Engineering Materials and Processing	2
MEE 310	Geometric Dimensioning and Tolerancing (GD&T)	2
MEE 405	Finite Element Analysis (FEA)	3
EGR 370	Introduction to Robotics	2
EEE 340	Electrical Machines	2
MEE 410	Mechanical Vibration	3
MEE 460	Design of Thermal Systems	3
CPE 210	Digital Systems	3
DES 101	Fund Design Studio	3
DES 151	Human Centered Design	3
DES 303	Structures	3
DES 353	Sustainable Design	3
DES 451	Design Social Entrepreneurship	3
MEE 396	Special Topics in Mechanical Engineering	1-3
MEE 495	Independent Study/Research in Mechanical Engineering	1-2

Total credit hours for the BSE degree with a specialization in mechanical engineering **135**

Design Engineering Specialization - Program requirement 94 credit hours

28 in mathematics/natural science/computer science core, 26 in general engineering core, 20 in art and design (14 required and 6 electives), 14 in discipline-specific engineering, 6 additional math and science, and 41 in other gen ed requirements.

6-7 additional credit hours of mathematics, natural or life sciences. Courses may be selected from the following list, or substitutions may be approved by the division chair:

MAT 112 or MAT 204	Statistics	3
MAT 255	Calculus III	4
MAT 322	Mathematical Modeling	3
PHY 140	Astronomy	3
PHY 147	Physics of Music	4
BIO 102	Human Biology	4
BIO 106	Environment and Society	3
BIO 107	Crops and Society	3
BIO 111	Anatomy and Physiology I	4
BIO 112	Anatomy and Physiology II	4
BIO 125	Principles of Biology	4
BIO 201	Animal Biology	4
BIO 202	Plant Biology	4
BIO 301	Ecology	3

14 credit hours required art and design courses:

ART 101	Ideation/Interpretation	3
ART 111	OBS/REP1: Empirical Drawing	3
ART 131	Ideation/Interpretation 2	3
ART 120	OBS/REP2: Empirical Drawing	3
EGR 350	Advanced CAD	2

6 credit hours of art and design electives from the following:

DES 151	Human Centered Design	3
DES 101	Fund Design Studio	3
DES 201	User Experience Design	3
DES 303	Structures	3
DES 353	Sustainable Design	3
DES 451	Design Social Entrepreneurship	3

14 additional credit hours of discipline-specific engineering electives from any CIE, CPE, EEE, EGR, or MEE courses (at least two courses must be at the 300 level or above, and at least one course must be at the 400 level)

Total credit hours for the BSE degree with a specialization in design engineering **135-136**

Appendix 1 Sample Plan of Study for Electrical Engineering Specialization

Semester 1	**Semester 2**
Calculus I (4)	Calculus II (4)
* Chemistry for Engineers (4)	Computer Aided Design (3)
Introduction to Engineering (3)	Intro to Programming (3)
World Literature - FYE Course (3)	World Civilization (3)
English Composition (3)	Philosophy (3)
	Physical Education (1)
Total: 17	Total: 17
Semester 3	**Semester 4**
Calculus III (4)	Differential Equations with Linear Algebra (4)
* University Physics I (4)	* University Physics II (5)
*Solid Mechanics (4)	*Electrical Circuits & Instrumentation (4)
Digital Systems (3)	Engineering Elective (1)
Engineering Elective (1)	Fine Arts (3)
Physical Education (1)	
Total: 17	Total: 17
Semester 5	**Semester 6**
*Electronic Devices & Circuits I (4)	Applied Statistics I (3)
Matlab for Problem Solving (2)	*Microprocessor Systems (4)
Analysis & Design of Circuit (3)	Signals and Systems (3)
Engineering Elective (2)	Engineering Elective (1)
New Testament (3)	Electromagnetic Fields and Waves (3)
Social Science (3)	Social Science (3)
Total: 17	Total: 17
Semester 7	**Semester 8**
Senior Design Project I (2)	Senior Design Project II (3)
Automatic Control (3)	Engineering Economy (2)
Engineering Elective (3)	Engineering & Environmental Ethics (2)
Engineering Thermodynamics (3)	Old Testament (3)
Advanced Writing/Literature (3)	Principles of Communication (3)
Social Science (3)	Theology (3)
Total: 17	Total: 16

Math/Science (32)
Engineering & Computer Science (54) (*with lab)
General Education (41) note: Intercultural Experience (IE) course (3) can be met by choosing a general education course with the IE designation

Total: 135

Appendix 2 Sample Plan of Study for Computer Engineering Specialization

Semester 1	**Semester 2**
Calculus I (4)	Calculus II (4)
Chemistry for Engineers (4)	Computer Aided Design (3)
Introduction to Engineering (3)	Object-Oriented Programming (4)
Intro to Programming (3)	Fine Arts (3)
World Civilization - FYE Course (3)	English Composition (3)
Total: 17	Total: 17
Semester 3	**Semester 4**
*University Physics I (4)	Discrete Math (3)
Digital Systems (3)	*University Physics II (5)
Data Structures (4)	*Electrical Circuits Instrumentation (4)
World Literature (3)	CPE/EGR/CIS/EEE Elective (1)
Philosophy (3)	Social Science (3)
	Physical Education (1)
Total: 17	Total: 17
Semester 5	**Semester 6**
*Electronic Devices & Circuits I (4)	DFQ w/ Linear Algebra (4)
*Solid Mechanics (4)	CPE/EGR/CIS/EEE Elective (1)
Engineering Thermodynamics (3)	Operating Systems (3)
New Testament (3)	Engineering Economy (2)
Social Science (3)	Computer Network Fundamentals (3)
	*Microprocessor Systems (4)
Total: 17	Total: 17
Semester 7	**Semester 8**
Senior Design Project I (2)	Senior Design Project II (3)
Computer Architecture (3)	CPE/EGR/CIS/EEE Elective (1)
CIS/CPE/EEE/EGR Elective (3)	Engineering & Environmental Ethics (2)
Old Testament (3)	Math Elective (3)
Advanced Writing/Literature (3)	Principles of Communication (3)
Social Science (3)	Theology (3)
	Physical Education (1)
Total: 17	Total: 16

Math/Science (31)
Engineering & Computer Science (57) (*with lab)
General Education (41) note: Intercultural Experience (IE) course (3) can be met by choosing a general education course with the IE designation

Total: 135-136

Appendix 3 Sample Plan of Study for Mechanical Engineering Specialization

Semester 1	**Semester 2**
Calculus I (4)	Calculus II (4)
Chemistry for Engineers (4)	Computer Aided Design (3)
Introduction to Engineering (3)	Intro to Programming (3)
Fine Arts - FYE Course (3)	World Civilization (3)
English Composition (3)	Philosophy (3)
Total: 17	Total: 16
Semester 3	**Semester 4**
Calculus III (4)	Differential Equations with Linear Algebra (4)
* University Physics I (4)	*University Physics II (5)
*Solid Mechanics (4)	Dynamics (3)
Advanced CAD (2)	*Electrical Circuits & Instrumentation (4)
World Literature (3)	Physical Education (1)
Total: 17	Total: 17
Semester 5	**Semester 6**
Matlab for Problem Solving (2)	Applied Statistics I (3)
*Mechanics of Materials (4)	Manufacturing Engineering (2)
Engineering Elective (1)	Engineering Economy (2)
Mechanics & Design of Machinery (3)	*Fluid Mechanics (4)
Engineering Thermodynamics (3)	New Testament (3)
Theology (3)	Social Science (3)
Physical Education (1)	
Total: 17	Total: 17
Semester 7	**Semester 8**
Senior Design Project I (2)	Senior Design Project II (3)
Machine Component Design (3)	Engineering Elective (3)
Engineering Electives (3)	Engineering & Environmental Ethics (2)
Heat Transfer (3)	Old Testament (3)
Social Science (3)	Principles of Communication (3)
Advanced Writing/Literature (3)	Social Science (3)
Total: 17	Total: 17

Math/Science (32)
Engineering & computer science (56) (*with lab)
General Education (41) note: Intercultural Experience (IE) course (3) can be met by choosing a general education course with the IE designation

Total: 135

Appendix 4 Sample Plan of Study for Civil Engineering Specialization

Semester 1	**Semester 2**
Calculus I (4)	Calculus II (4)
Chemistry for Engineers (4)	Computer Aided Design (3)
EGR 121 Introduction to Engineering (3)	Intro to Programming (3)
Philosophy - FYE Course (3)	World Civilization (3)
English Composition (3)	Fine Arts (3)
Total: 17	Physical Education (1)
	Total: 17
Semester 3	**Semester 4**
Calculus III (4)	Differential Equations with Linear Algebra (4)
*University Physics I (4)	*University Physics II (5)
*Solid Mechanics (4)	Geomatics Engineering (3)
World Literature (3)	*Electrical Circuits & Instrumentation (4)
Physical Education (1)	Engineering Elective (1)
Engineering Elective (1)	
Total: 17	Total: 17
Semester 5	**Semester 6**
Structural Analysis (3)	Applied Statistics I (3)
Matlab for Problem Solving (2)	*Fluid Mechanics (4)
Engineering Thermodynamics (3)	Engineering Economy (2)
New Testament (3)	Engineering Elective (1)
Social Science (3)	Geotechnical Engineering (4)
Old Testament (3)	Advanced Writing/Literature (3)
Total: 17	Total: 17
Semester 7	**Semester 8**
Senior Design Project I (2)	Senior Design Project II (3)
Heat Transfer (3)	Engineering Elective (3)
Urban Hydrology (2)	Engineering & Environmental Ethics (2)
Structural Steel Design (3)	Reinforced Concrete Design (3)
Social Science (3)	Social Science (3)
Theology (3)	Principles of Communication (3)
Total: 16	Total: 17

Math/Science (32)
Engineering & Computer Science (56) (*with lab)
General Education (41) note: Intercultural Experience (IE) course (3) can be met by choosing a general education course with the IE designation

Total: 135

Appendix 5 Sample Plan of Study for Design Engineering Specialization

Semester 1	**Semester 2**
Calculus I (4)	Calculus II (4)
Chemistry for Engineers (4)	Computer Aided Design (3)
Introduction to Engineering (3)	Intro to Programming (3)
Philosophy - FYE Course (3)	New Testament (3)
Art 101 (3)	Art 111 (3)
Total: 17	Total: 16
Semester 3	**Semester 4**
Art 131 (3)	Differential Equations with Linear Algebra (4)
*University Physics I (4)	*University Physics II (5)
*Solid Mechanics (4)	Art 120 (3)
World Literature (3)	*Electrical Circuits & Instrumentation (4)
Advanced CAD (2)	Physical Education (1)
Engineering Elective (1)	Total: 17
Total: 17	
Semester 5	**Semester 6**
English Composition (3)	Math or Science Elective (3)
Engineering Electives (4)	Principles of Communication (3)
Engineering Thermodynamics (3)	Engineering Economy (2)
DES Elective (3)	DES Elective (3)
Fine Arts (3)	Social Science (3)
Physical Education (1)	Advanced Writing/Literature (3)
Total: 17	Total: 17
Semester 7	**Semester 8**
Senior Design Project I (2)	Senior Design Project II (3)
Engineering Elective (3)	Engineering Elective (3)
Engineering Elective (3)	Engineering & Environmental Ethics (2)
Math or Science Elective (3)	World Civilization (3)
Social Science (3)	Social Science (3)
Theology (3)	Old Testament (3)
Total: 17	Total: 17

Math/Science (31)
Engineering & Computer Science (45) (*with lab)
Art+Design (20)
General Education (41) note: Intercultural Experience (IE) course (3) can be met by choosing a general education course with the IE designation

Total: 135-136